PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 28 February 2001 (28.02.01)	
International application No. PCT/NO00/00213	**Applicant's or agent's file reference** P 8687
International filing date (day/month/year) 21 June 2000 (21.06.00)	**Priority date** (day/month/year) 24 June 1999 (24.06.99)
Applicant BAKKE, Stig	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

29 December 2000 (29.12.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

R. E. Stoffel

Telephone No.: (41-22) 338.83.38

REPLACED BY ART 34 AMDT

PATENT COOPERATION TREATY

PCT

REC'D 13 JUL 2001
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 8687	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/NO00/00213	International filing date *(day/month/year)* 21.06.2000	Priority date *(day/month/year)* 24.06.1999
International Patent Classification (IPC) or national classification and IPC7 E21B 7/08, E21B 17/20		
Applicant Bakke Technology AS et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of (6) 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
29.12.2000	08.06.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Telex 17978 PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Christer Bäcknert / MRo Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/NO00/00213

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:
pages 1-9 , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the claims:
pages _____ , as originally filed
pages 12-15 , as amended (together with any statement) under article 19
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the drawings:
pages 1-5 , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the sequence listing part of the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language English which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☒ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:
HÅMSØ, Eivind
Håmsø Patentbyrå Ans
Jostein Soppeland
Box 171
N-4302 Sandnes
NORVEGE

Date of mailing (day/month/year)	
04 January 2001 (04.01.01)	
Applicant's or agent's file reference P 8687	**IMPORTANT NOTICE**

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/NO00/00213	21 June 2000 (21.06.00)	24 June 1999 (24.06.99)

Applicant: BAKKE TECHNOLOGY AS et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AG,AU,BZ,DZ,KP,KR,MZ,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CN,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD, GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX, NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW
   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   04 January 2001 (04.01.01) under No. WO 01/00980

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

19. -3- 2001

From the INTERNATIONAL BUREAU

PCT

INFORMATION CONCERNING ELECTED OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

To:

HÅMSØ, Eivind
Håmsø Patentbyrå Ans
Jostein Soppeland
Box 171
N-4302 Sandnes
NORVEGE

Date of mailing (day/month/year) 28 February 2001 (28.02.01)	
Applicant's or agent's file reference P 8687	IMPORTANT INFORMATION

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/NO00/00213	21 June 2000 (21.06.00)	24 June 1999 (24.06.99)

Applicant
BAKKE TECHNOLOGY AS et al

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

   AP :GH,GM,KE,LS,MW,MZ,SD,SL,SZ,TZ,UG,ZW
   EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE
   National :AU,BG,CA,CN,CZ,DE,IL,JP,KP,KR,MN,NO,NZ,PL,RO,RU,SE,SK,US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

   EA :AM,AZ,BY,KG,KZ,MD,RU,TJ,TM
   OA :BF,BJ,CF,CG,CI,CM,GA,GN,GW,ML,MR,NE,SN,TD,TG
   National :AE,AG,AL,AM,AT,AZ,BA,BB,BR,BY,BZ,CH,CR,CU,DK,DM,DZ,EE,ES,FI,GB,
   GD,GE,GH,GM,HR,HU,ID,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MW,
   MX,MZ,PT,SD,SG,SI,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW

3. The applicant is reminded that he must enter the "national phase" before the expiration of 30 months from the priority date before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing , if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

   Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

   The entry into the European regional phase is postponed until 31 months from the priority date for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:
R. E. Stoffel

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING SUBMISSION OR TRANSMITTAL OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

HÅMSØ, Eivind
Håmsø Patentbyrå Ans
Jostein Soppeland
Box 171
N-4302 Sandnes
NORVÈGE

Date of mailing (day/month/year) 27 July 2000 (27.07.00)	
Applicant's or agent's file reference P 8687	IMPORTANT NOTIFICATION
International application No. PCT/NO00/00213	International filing date (day/month/year) 21 June 2000 (21.06.00)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 24 June 1999 (24.06.99)
Applicant BAKKE TECHNOLOGY AS et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.

3. An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
24 June 1999 (24.06.99)	19993138	NO	30 June 2000 (30.06.00)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

Catherine Massetti

Telephone No. (41-22) 338.83.38

-9 -8- 2000

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF RECEIPT OF RECORD COPY

(PCT Rule 24.2(a))

To:

HÅMSØ, Eivind
Håmsø Patentbyrå Ans
Jostein Soppeland
Box 171
N-4302 Sandnes
NORVÈGE

Date of mailing (day/month/year)	IMPORTANT NOTIFICATION
27 July 2000 (27.07.00)	
Applicant's or agent's file reference	**International application No.**
P 8687	PCT/NO00/00213

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

BAKKE TECHNOLOGY AS (for all designated States except US)
BAKKE, Stig (for US)

International filing date	:	21 June 2000 (21.06.00)
Priority date(s) claimed	:	24 June 1999 (24.06.99)
Date of receipt of the record copy by the International Bureau	:	30 June 2000 (30.06.00)
List of designated Offices	:	

AP :GH,GM,KE,LS,MW,MZ,SD,SL,SZ,TZ,UG,ZW
EA :AM,AZ,BY,KG,KZ,MD,RU,TJ,TM
EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE
OA :BF,BJ,CF,CG,CI,CM,GA,GN,GW,ML,MR,NE,SN,TD,TG
National :AE,AG,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EE, ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,LU,LV,MA, MD,MG,MK,MN,MW,MX,MZ,NO,NZ,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,US, UZ,VN,YU,ZA,ZW

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- [X] time limits for entry into the national phase
- [ ] confirmation of precautionary designations
- [ ] requirements regarding priority documents

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer: Catherine Massetti
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

Form PCT/IB/301 (July 1998)

003434378

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 00/00213

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E21B 7/08, E21B 17/20
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2271795 A (STIRLING DESIGN INTERNATIONAL LIMITED), 27 April 1994 (27.04.94), page 7 - page 8, figures 4-5	1,4-8
Y	US 5392867 A (DU CHAFFAUT ET AL), 28 February 1995 (28.02.95), column 5 - column 8, figures 2,4B,4C	1,4-8
A	US 5316094 A (PRINGLE), 31 May 1994 (31.05.94)	1-13
A	US 5894896 A (SMITH ET AL), 20 April 1999 (20.04.99)	1-13

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 Sept 2000	11 -10- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Christer Bäcknert / JA A Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/NO 00/00213

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2271795 A	27/04/94	US 5441119 A	15/08/95
US 5392867 A	28/02/95	CA 2076026 A	22/06/92
		EP 0516806 A,B	09/12/92
		FR 2670824 A,B	26/06/92
		NO 303548 B	27/07/98
		WO 9211461 A	09/07/92
US 5316094 A	31/05/94	CA 2105474 A,C	21/04/94
		FR 2698125 A,B	20/05/94
		FR 2709147 A,B	24/02/95
		FR 2709148 A,B	24/02/95
		GB 2271791 A,B	27/04/94
		GB 2293187 A,B	20/03/96
		GB 9524958 D	00/00/00
		NO 933466 A	21/04/94
		NO 995347 A	21/04/94
		US 5373898 A	20/12/94
US 5894896 A	20/04/99	CA 2183033 A	10/02/98

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 8687	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/NO00/00213	International filing date *(day/month/year)* 21.06.2000	Priority date *(day/month/year)* 24.06.1999
International Patent Classification (IPC) or national classification and IPC7 E21B 7/08, E21B 17/20		
Applicant Bakke Technology AS et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
29.12.2000	08.06.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Telex 17978 PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Christer Bäcknert / MRo Telephone No. 08-782 25 00

PATENT COOPERATION TREATY

15 -03- 2001

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
AMENDMENTS OF THE CLAIMS

(PCT Rule 62 and
Administrative Instructions, Section 417)

To:

Swedish Patent Office
P.O. Box 5055
S-102 42 Stockholm
SUÈDE

in its capacity as International Preliminary Examining Authority

Date of mailing (day/month/year)	
28 February 2001 (28.02.01)	
International application No.	**International filing date (day/month/year)**
PCT/NO00/00213	21 June 2000 (21.06.00)

Applicant

BAKKE TECHNOLOGY AS et al

The International Bureau hereby transmits a copy of the amendments to the claims under Article 19 together with any accompanying statement (Rule 62).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

R. E. Stoffel

Telephone No. (41-22) 338.83.38

håmsø
PATENTBYRÅ
Patents, Trademarks & Designs
Established 1950
Member of the Association of Norwegian Patent Agents
Member of the Norwegian Bar Association

The International Bureau of WIPO
34 chemin des Colombettes
CH-1211 Geneva
SWITZERLAND

4/21 922

REC'D 11 DEC 2000
Your ref:
WIPO PCT
Our ref: P 8687

By telefax 5 pages

Date: 06 December 2000

Dear Sirs,

CONFIRMATION

RE: INTERNATIONAL PATENT APPLICATION NO. PCT/NO00/00213 - Bakke Technology AS

Statement under article 19(1).

Please find enclosed new pages 12 to 15 of the application.
The amendments reflect changes in the set of claims as proposed during the Norwegian application process, and are briefly as follows:

Page 12: The introductory part has been slightly altered as the type of choke needed is generalised. The previous claim N° 10 is amended into the characterising part of claim N° 1. The characterising part of claim N° 1 is a new claim N° 2.
Page 13 - 15: Previous claims N° 2 - 9 has been renumbered 3 - 10.

No amendments has been undertaken with regards to the body of the application or to the figures.

Yours faithfully,
HÅMSØ PATENTBYRÅ ANS

Hamsø

Gunnar Håmsø

Enclosures: Pages 12 - 15 of the application.

Postal Address: Håmsø Patentbyrå ANS, P.O. Box 171, N-4302 Sandnes, Norway
Office Address: Håmsø Patentbyrå ANS, Vågsgaten 43, N-4306 Sandnes, Norway
Telephone: Nat. 51 66 20 20, Int. +47 51 66 20 20
Telefax: Nat. 51 66 18 96, Int. +47 51 66 18 96
E-mail: patent@hamso.no
Bank Account: 9688.05.01205 Handelsbanken
Postal Giro: 0804 5654843 Swift code PGINNOKK
Enterprise No. 968502204

Claims

1. A device by a tool (1) adapted for changing the direction of drilling during drilling with drilling equipment, which preferably comprises a drill string such as coiled tubing, drill string sub, drilling engine and drill bit, wherein the tool (1) is positioned between the drill string and the bent sub, comprises housing elements (2-4), which are connected to one another, has a passage for, i.a., fluid such as drilling fluid, and wherein the tool (1) is equipped with a hydraulic piston (18) having been provided with a set of co-operating guides (26, 27) where the guides (26, 27) are arranged for by the pistons axial displacement a forced guiding of the rotation of one of the hosing elements (5) with respect to the other housing elements (2-4), and where necessary fluid pressure for moving the piston (18) is obtained by choking the pressurefluid flow through tool (1), characterized in that the lower intermediate housing element (4) and the lower housing element (5) are connected by a one direction rotatable connection (8) such as a roller bearing, adapted for only allowing rotation in one direction and opposes any rotation in the other direction at any rotational position.

2. A device according to claim 1, characterized in that one set of the guides (26) is formed in the wall of the passage, and one set of guides (27) is formed in the wall of the piston (18) opposite.

3. A device according to one or any of the preceding claims, characterized in that said set of guides (26, 27) for the forced guiding of the rotation are formed by twisted splines, one set of splines (26) being formed in a circumferential portion of the upper intermediate housing element (3), whereas one set of splines (27) is formed in a circumferential portion of the piston (18).

4. A device according to one or any of the preceding claims, characterized in that the former set of splines (26) extends in a region at the upper end of the lower housing element (5), whereas the latter set of splines (27) extends essentially in the longitudinal direction of the piston (18).

5. A device according to one or any of the preceding claims, characterized in that the valve comprises a valve seat (20) formed at the upper end of a bore adapted to provide a passage through the piston (18), a valve body (21) and a valve mechanism (22, 23, 24) adapted for choking and opening the valve by increase and relief, respectively, of the fluid pressure in the tool (1).

6. A device according to one or any of the preceding claims, characterized in that the valve mechanism is formed by an upper and a lower valve body part (22, 23) adapted for displacement along the valve body (21), so that the lower valve body part (23) can choke or open the valve, and a valve body spring (24), wherein the upper valve body part (22) will displace the

lower valve body part (23) to choke the valve when the pressure of the fluid is increased, and the valve body spring (24) will displace the lower valve body part (23) in the opposite direction to open the valve by a relief of the pressure of the fluid.

7. A device according to one or any of the previous claims, characterized in that the piston (18) is adapted to be displaced by the fluid supplied to the tool (1) when the valve has been choked, or be displaced in the opposite direction by a piston spring (25), positioned in an upper annular space (17), formed in the passage of the tool (1), after the valve has opened.

8. A device according to one or any of the previous claims, characterized in that the piston (18) is sleeve-shaped, positioned between an upper shoulder (14) formed in the passage of the tool (1), and a shoulder element (31) located in the upper annular space (17), and formed with a length which enables the piston (18) to extend from the upper shoulder (14) into the upper annular space (17) located in the extension above a lower shoulder (15) formed at the lower end of the upper annular space (17).

9. A device according to one or any of the previous claims, characterized in that the piston (18) and the upper end of the lower housing element (5) are displaceably and rotatably connected.

10. A device according to one or any of the previous claims, characterized in that the displaceable and

rotatable connection is formed by a ratchet mechanism (28) formed with catch elements (30) locking against, or running freely across, guides (29) formed at the upper end of the lower housing element (5), so that the lower housing element (5) is subjected to rotation when the piston (18) is displaced down the passage of the tool (1), or is without rotation when the piston (18) is displaced back through the passage of the tool (1).

11. A device according to one or any of the previous claims, c h a r a c t e r i z e d i n that the lower housing element (5) has a lower annular space (36) arranged thereto, for fluid which is displaced from the upper annular space (17), that the annular spaces (17, 36) communicate by means of channels (38, 39) extending between the annular spaces (17, 36), and that the flow of displaced fluid can be controlled by a check valve (40) and a choke valve (41) placed in the respective channels (38, 39).

12. A device according to one or any of the previous claims, c h a r a c t e r i z e d i n that the lower annular space (36) has a displaceable annular space body (37) arranged thereto.

13. A device according to one or any of the previous claims, c h a r a c t e r i z e d i n that the valve body (21) and the valve body part (22) are formed with bores, so that, for example, a cable can be drawn through the passage of the tool (1).

Claims

1. A device by a tool (1) adapted for changing the direction of drilling during drilling with drilling equipment, which preferably comprises a drill string such as coiled tubing, drill string sub, drilling engine and drill bit, wherein the tool (1) is positioned between the drill string and the bent sub, comprises housing elements (2-4), which are connected to one another, has a passage for, i.a., fluid such as drilling fluid, and wherein the tool (1) can be activated for rotation of the drill string sub, so that the direction of drilling is changed, the tool (1) having means (18, 20-24, 26, 27) arranged thereto, which are adapted so that rotation may take place in an infinitely variable manner, and wherein said means (18, 20-24, 26, 27) are positioned in the passage of the tool (1) and comprise a valve (20-24) arranged to choke the passage, so that the tool (1) can be activated for rotation, there being provided a piston (18) arranged to initiate rotation after the passage has been choked, whereas a set of co-operating guides (26, 27) are arranged for forced guiding of the rotation, characterized in that one set of guides (26) are formed in the wall of the passage, and one set of guides (27) is formed in the wall of the piston (18) opposite.

2. A device according to claim 1, characterized in that said set of guides (26, 27) for the forced guiding of the rotation are formed by twisted splines, one set of splines (26) being formed in a circumferential portion of the upper intermediate housing element

(3), whereas one set of splines (27) is formed in a circumferential portion of the piston (18).

3. A device according to claim 2, characterized in that the former set of splines (26) extends in a region at the upper end of the lower housing element (5), whereas the latter set of splines (27) extends essentially in the longitudinal direction of the piston (18).

4. A device according to claim 1, characterized in that the valve comprises a valve seat (20) formed at the upper end of a bore adapted to provide a passage through the piston (18), a valve body (21) and a valve mechanism (22, 23, 24) adapted for choking and opening the valve by increase and relief, respectively, of the fluid pressure in the tool (1).

5. A device according to claim 4, characterized in that the valve mechanism is formed by an upper and a lower valve body part (22, 23) adapted for displacement along the valve body (21), so that the lower valve body part (23) can choke or open the valve, and a valve body spring (24), wherein the upper valve body part (22) will displace the lower valve body part (23) to choke the valve when the pressure of the fluid is increased, and the valve body spring (24) will displace the lower valve body part (23) in the opposite direction to open the valve by a relief of the pressure of the fluid.

6. A device according to any one of the preceding claims, characterized in that the piston (18) is

adapted to be displaced by the fluid supplied to the tool (1) when the valve has been choked, or be displaced in the opposite direction by a piston spring (25), positioned in an upper annular space (17), formed in the passage of the tool (1), after the valve has opened.

7. A device according to claim 6, characterized in that the piston (18) is sleeve-shaped, positioned between an upper shoulder (14) formed in the passage of the tool (1), and a shoulder element (31) located in the upper annular space (17), and formed with a length which enables the piston (18) to extend from the upper shoulder (14) into the upper annular space (17) located in the extension above a lower shoulder (15) formed at the lower end of the upper annular space (17).

8. A device according to any one of the preceding claims, characterized in that the piston (18) and the upper end of the lower housing element (5) are displaceably and rotatably connected.

9. A device according to claim 8, characterized in that the displaceable and rotatable connection is formed by a ratchet mechanism (28) formed with catch elements (30) locking against, or running freely across, guides (29) formed at the upper end of the lower housing element (5), so that the lower housing element (5) is subjected to rotation when the piston (18) is displaced down the passage of the tool (1), or is without rotation when the piston (18) is displaced back through the passage of the tool (1).

10. A device according to any one of the preceding claims, characterized in that the lower intermediate housing element (4) and the lower housing element (5) are connected by a rotatable connection (8) such as a roller bearing, adapted for only allowing rotation opposite the direction of rotation providing the change of the direction of drilling.

11. A device according to any one of the preceding claims, characterized in that the lower housing element (5) has a lower annular space (36) arranged thereto, for fluid which is displaced from the upper annular space (17), that the annular spaces (17, 36) communicate by means of channels (38, 39) extending between the annular spaces (17, 36), and that the flow of displaced fluid can be controlled by a check valve (40) and a choke valve (41) placed in the respective channels (38, 39).

12. A device according to claim 11, characterized in that the lower annular space (36) has a displaceable annular space body (37) arranged thereto.

13. A device according to any one of the preceding claims, characterized in that the valve body (21) and the valve body part (22) are formed with bores, so that, for example, a cable can be drawn through the passage of the tool (1).

AMENDED CLAIMS

[received by the International Bureau on 06 December 2000 (06.12.00); original claims 1-13 replaced by new claims 1-13 (4 pages)]

1. A device by a tool (1) adapted for changing the direction of drilling during drilling with drilling equipment, which preferably comprises a drill string such as coiled tubing, drill string sub, drilling engine and drill bit, wherein the tool (1) is positioned between the drill string and the bent sub, comprises housing elements (2-4), which are connected to one another, has a passage for, i.a., fluid such as drilling fluid, and wherein the tool (1) is equipped with a hydraulic piston (18) having been provided with a set of co-operating guides (26, 27) where the guides (26, 27) are arranged for by the pistons axial displacement a forced guiding of the rotation of one of the hosing elements (5) with respect to the other housing elements (2-4), and where necessary fluid pressure for moving the piston (18) is obtained by choking the pressurefluid flow through tool (1), c h a r a c t e r i z e d i n that the lower intermediate housing element (4) and the lower housing element (5) are connected by a one direction rotatable connection (8) such as a roller bearing, adapted for only allowing rotation in one direction and opposes any rotation in the other direction at any rotational position.

2. A device according to claim 1, c h a r a c t e r i z e d i n that one set of the guides (26) is formed in the wall of the passage, and one set of guides (27) is formed in the wall of the piston (18) opposite.

3. A device according to one or any of the preceding claims, characterized in that said set of guides (26, 27) for the forced guiding of the rotation are formed by twisted splines, one set of splines (26) being formed in a circumferential portion of the upper intermediate housing element (3), whereas one set of splines (27) is formed in a circumferential portion of the piston (18).

4. A device according to one or any of the preceding claims, characterized in that the former set of splines (26) extends in a region at the upper end of the lower housing element (5), whereas the latter set of splines (27) extends essentially in the longitudinal direction of the piston (18).

5. A device according to one or any of the preceding claims, characterized in that the valve comprises a valve seat (20) formed at the upper end of a bore adapted to provide a passage through the piston (18), a valve body (21) and a valve mechanism (22, 23, 24) adapted for choking and opening the valve by increase and relief, respectively, of the fluid pressure in the tool (1).

6. A device according to one or any of the preceding claims, characterized in that the valve mechanism is formed by an upper and a lower valve body part (22, 23) adapted for displacement along the valve body (21), so that the lower valve body part (23) can choke or open the valve, and a valve body spring (24), wherein the upper valve body part (22) will displace the

lower valve body part (23) to choke the valve when the pressure of the fluid is increased, and the valve body spring (24) will displace the lower valve body part (23) in the opposite direction to open the valve by a relief of the pressure of the fluid.

7. A device according to one or any of the previous claims, characterized in that the piston (18) is adapted to be displaced by the fluid supplied to the tool (1) when the valve has been choked, or be displaced in the opposite direction by a piston spring (25), positioned in an upper annular space (17), formed in the passage of the tool (1), after the valve has opened.

8. A device according to one or any of the previous claims, characterized in that the piston (18) is sleeve-shaped, positioned between an upper shoulder (14) formed in the passage of the tool (1), and a shoulder element (31) located in the upper annular space (17), and formed with a length which enables the piston (18) to extend from the upper shoulder (14) into the upper annular space (17) located in the extension above a lower shoulder (15) formed at the lower end of the upper annular space (17).

9. A device according to one or any of the previous claims, characterized in that the piston (18) and the upper end of the lower housing element (5) are displaceably and rotatably connected.

10. A device according to one or any of the previous claims, characterized in that the displaceable and

rotatable connection is formed by a ratchet mechanism (28) formed with catch elements (30) locking against, or running freely across, guides (29) formed at the upper end of the lower housing element (5), so that the lower housing element (5) is subjected to rotation when the piston (18) is displaced down the passage of the tool (1), or is without rotation when the piston (18) is displaced back through the passage of the tool (1).

11. A device according to one or any of the previous claims, characterized in that the lower housing element (5) has a lower annular space (36) arranged thereto, for fluid which is displaced from the upper annular space (17), that the annular spaces (17, 36) communicate by means of channels (38, 39) extending between the annular spaces (17, 36), and that the flow of displaced fluid can be controlled by a check valve (40) and a choke valve (41) placed in the respective channels (38, 39).

12. A device according to one or any of the previous claims, characterized in that the lower annular space (36) has a displaceable annular space body (37) arranged thereto.

13. A device according to one or any of the previous claims, characterized in that the valve body (21) and the valve body part (22) are formed with bores, so that, for example, a cable can be drawn through the passage of the tool (1).

Statement under article 19(1).

Please find enclosed new pages 12 to 15 of the application.
The amendments reflect changes in the set of claims as proposed during the Norwegian application process, and are briefly as follows:

Page 12: The introductory part has been slightly altered as the type of choke needed is generalised. The previous claim N° 10 is amended into the characterising part of claim N° 1. The characterising part of claim N° 1 is a new claim N° 2.
Page 13 - 15: Previous claims N° 2 - 9 has been renumbered 3 - 10.

No amendments has been undertaken with regards to the body of the application or to the figures.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No. PCT/NO 00 00213

International Filing Date 21 JUNI 2000 (21.06.00)

PATENTSTYRET

Name of Receiving Office and "PCT International Application"

Applicant's or agent's file reference (if desired) (12 characters maximum) P 8687

Box No. I TITLE OF INVENTION

Device by tool adapted to change the drilling direction while drilling

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

Bakke Technology AS
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N-4330 ÅLGÅRD
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☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State *(that is, country)* of nationality: NORWAY

State *(that is, country)* of residence: NORWAY

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

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NORWAY

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: NORWAY

State *(that is, country)* of residence: NORWAY

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

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☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

CONFIRMATION COPY

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes: at least one must be marked)*:

Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- ☒ AE United Arab Emirates
- ☒ AL Albania
- ☒ AM Armenia
- ☒ AT Austria ..... and Utility Model
- ☒ AU Australia
- ☒ AZ Azerbaijan
- ☒ BA Bosnia and Herzegovina
- ☒ BB Barbados
- ☒ BG Bulgaria
- ☒ BR Brazil
- ☒ BY Belarus
- ☒ CA Canada
- ☒ CH and LI Switzerland and Liechtenstein
- ☒ CN China
- ☒ CR Costa Rica
- ☒ CU Cuba
- ☒ CZ Czech Republic and Utility Model
- ☒ DE Germany ..... and Utility Model
- ☒ DK Denmark ..... and Utility Model
- ☒ DM Dominica
- ☒ EE Estonia ..... and Utility Model
- ☒ ES Spain
- ☒ FI Finland ..... and Utility Model
- ☒ GB United Kingdom
- ☒ GD Grenada
- ☒ GE Georgia
- ☒ GH Ghana
- ☒ GM Gambia
- ☒ HR Croatia
- ☒ HU Hungary
- ☒ ID Indonesia
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- ☒ JP Japan
- ☒ KE Kenya
- ☒ KG Kyrgyzstan
- ☒ KP Democratic People's Republic of Korea
- ☒ KR Republic of Korea
- ☒ KZ Kazakhstan
- ☒ LC Saint Lucia
- ☒ LK Sri Lanka
- ☒ LR Liberia
- ☒ LS Lesotho
- ☒ LT Lithuania
- ☒ LU Luxembourg
- ☒ LV Latvia
- ☒ MA Morocco
- ☒ MD Republic of Moldova
- ☒ MG Madagascar
- ☒ MK The former Yugoslav Republic of Macedonia
- ☒ MN Mongolia
- ☒ MW Malawi
- ☒ MX Mexico
- ☒ NO Norway
- ☒ NZ New Zealand
- ☒ PL Poland
- ☒ PT Portugal
- ☒ RO Romania
- ☒ RU Russian Federation
- ☒ SD Sudan
- ☒ SE Sweden
- ☒ SG Singapore
- ☒ SI Slovenia
- ☒ SK Slovakia ..... and Utility Model
- ☒ SL Sierra Leone
- ☒ TJ Tajikistan
- ☒ TM Turkmenistan
- ☒ TR Turkey
- ☒ TT Trinidad and Tobago
- ☒ TZ United Republic of Tanzania
- ☒ UA Ukraine
- ☒ UG Uganda
- ☒ US United States of America
- ☒ UZ Uzbekistan
- ☒ VN Viet Nam
- ☒ YU Yugoslavia
- ☒ ZA South Africa
- ☒ ZW Zimbabwe

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

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☒ AG - Antigua and Barbuda
☒ MZ - Mozambique

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)*

PCT/NO 0 0 00213

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) (24.06.99) 24 June 1999	19993138	Norway		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): (1)

** Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*
ISA/SE

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority):*
Date *(day/month/year)* Number Country *(or regional Office)*

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request	:	3
description (excluding sequence listing part)	:	9
claims	:	4
abstract	:	1
drawings	:	5
sequence listing part of description	:	
Total number of sheets	:	22

This international application is accompanied by the item(s) marked below:

1. ☒ fee calculation sheet
2. ☒ separate signed power of attorney
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☒ other *(specify)*: Copy of Off. Action of 24.11.99

Figure of the drawings which should accompany the abstract: 2

Language of filing of the international application: Norwegian

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

HÅMSØ PATENTBYRÅ ANS

Gunnar Håmsø

For receiving Office use only

1. Date of actual receipt of the purported international application: 21 JUNI 2000 (21.06.00)
2. Drawings: ☒ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority (if two or more are competent): ISA/SE
6. ☐ Transmittal of search copy delayed until search fee is paid.

For International Bureau use only

Date of receipt of the record copy by the International Bureau: 30 JUN 2000 (30.06.00)

Fig. 1

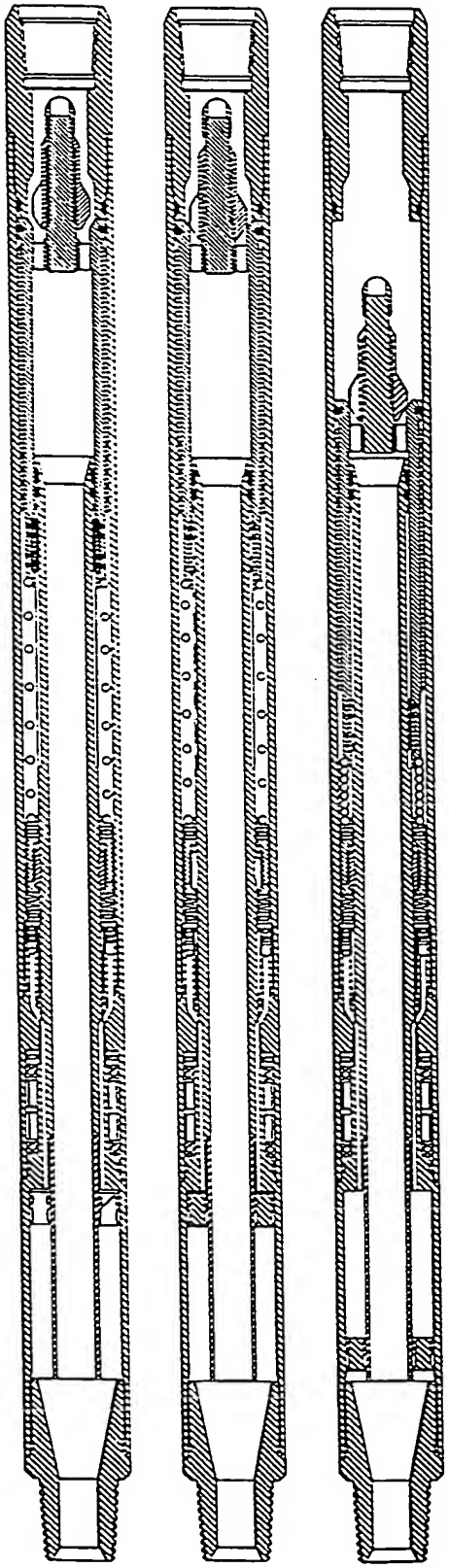


Fig. 2

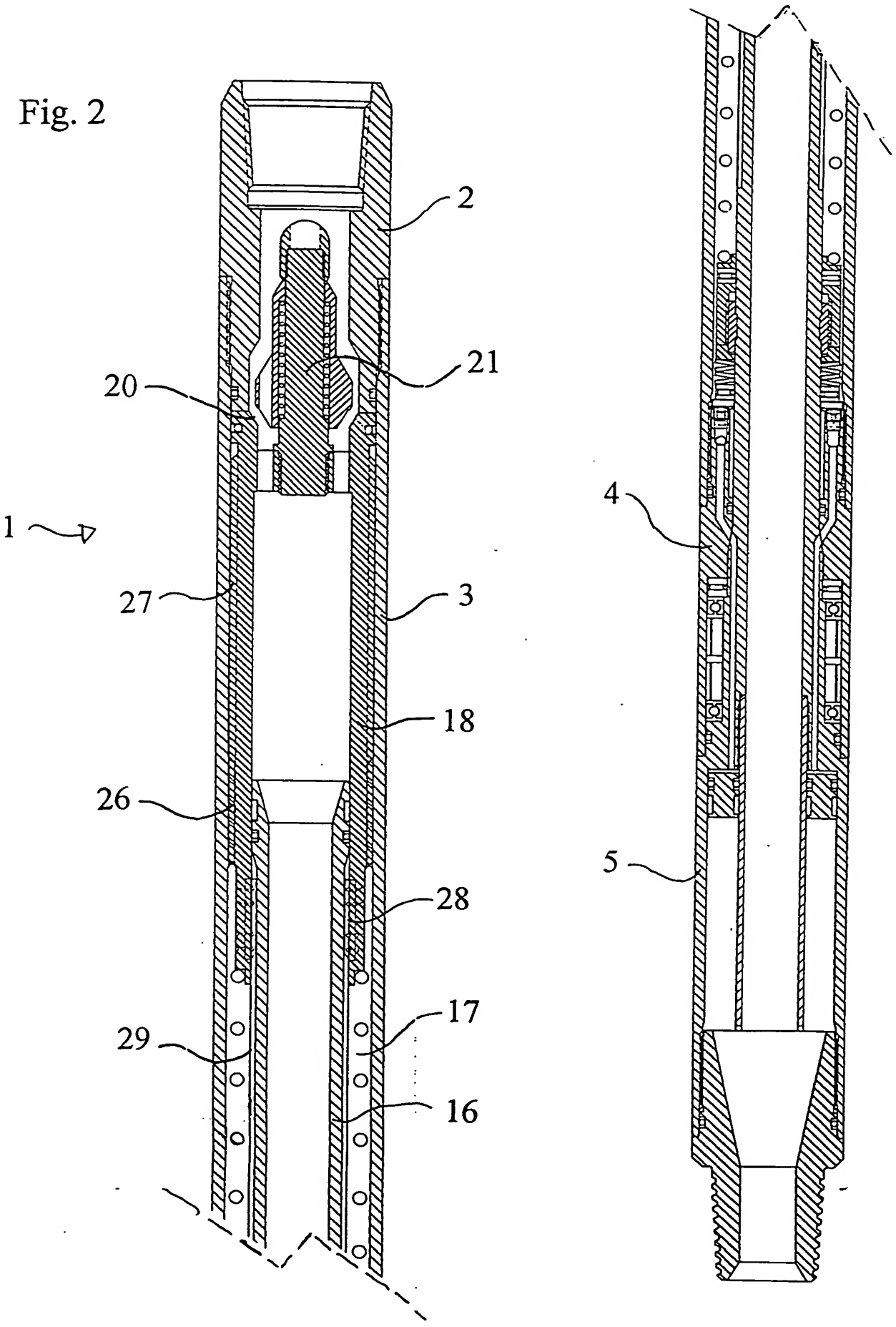
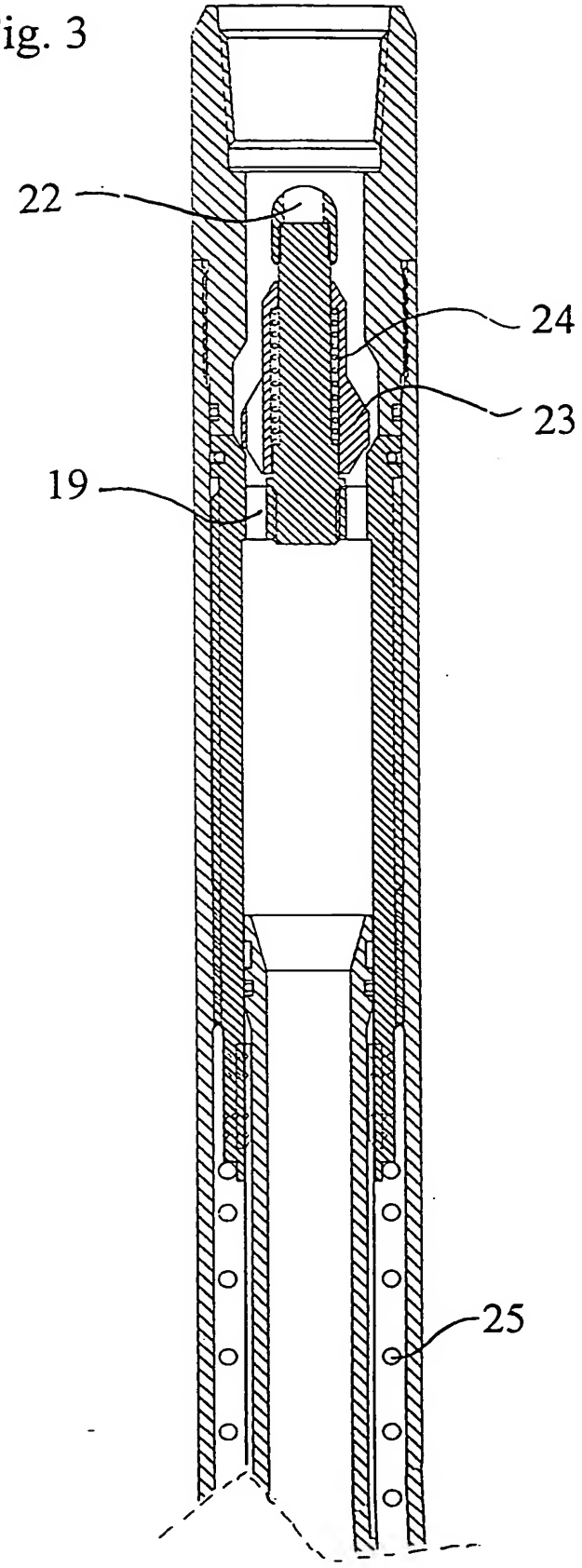


Fig. 3



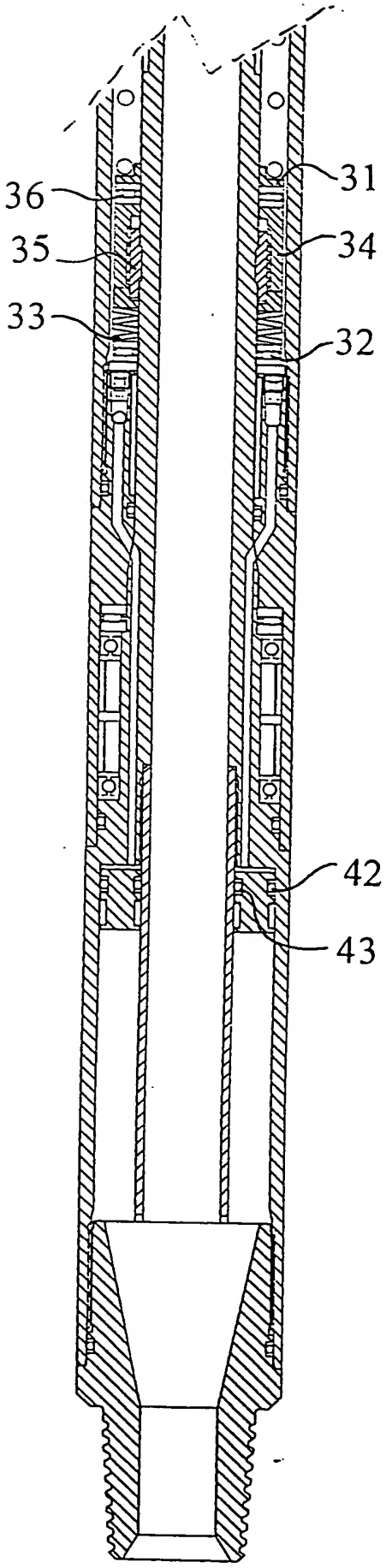


Fig. 4

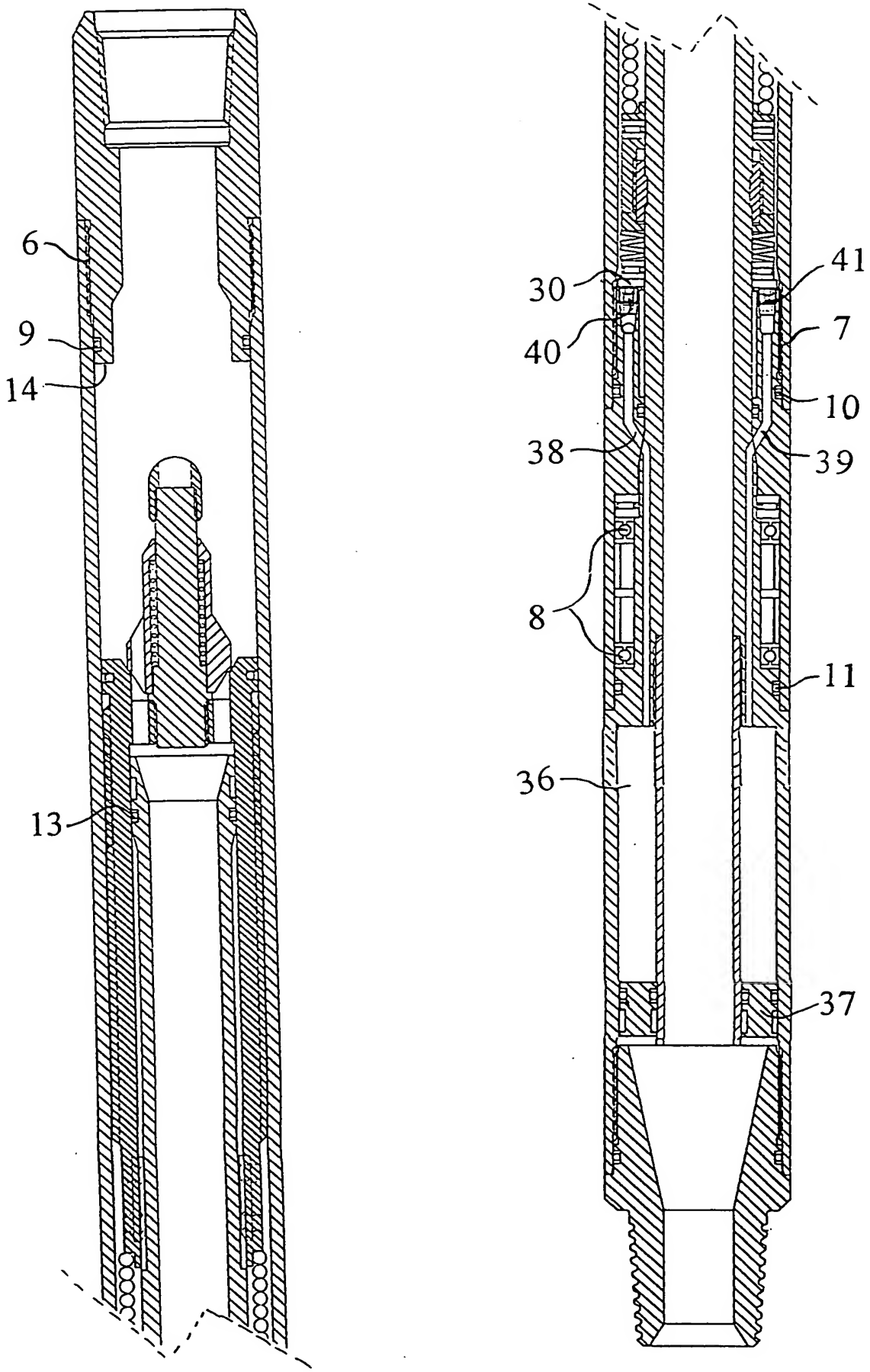
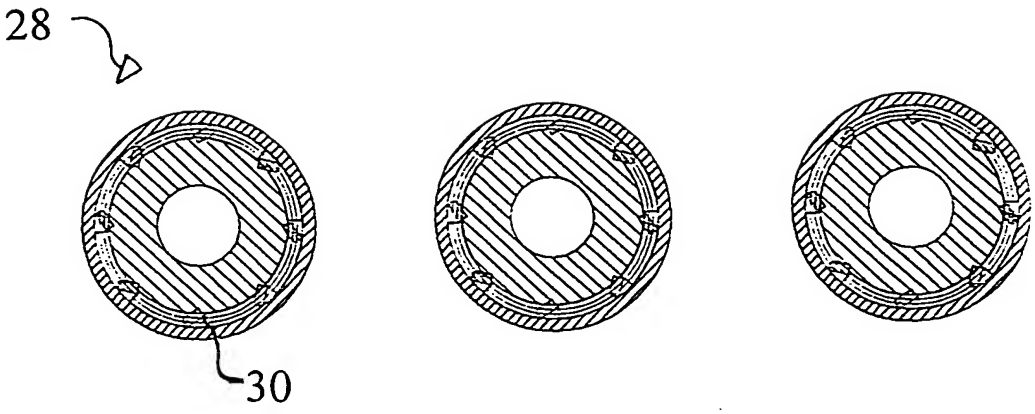


Fig. 5



ANORDNING VED VERKTØY TILPASSET FOR Å ENDRE BORERETNINGEN UNDER BORING

Oppfinnelsen angår en anordning ved et verktøy tilpasset for å endre boreretningen under boring med boreutstyr som fortrinnsvis omfatter borestreng så som kveilrør, bøyeledd (bent sub), boremotor og borekrone.

Under retningsboring i en formasjon i grunnen, f. eks. ved horisontalboring av en brønn, er det vanlig å bruke boreutstyr som omfatter borestreng, bøyeledd og borekrone. Borestrengen kan utgjøres av kveilrør, og borekronen kan være hydraulisk drevet av væsken som sirkulerer i borstrengen. Boreretningen endres ved rotasjon av bøyeleddet, og rotasjonen besørges av et verktøy som er plassert mellom nedre ende av borestrengen og bøyeleddet. I kjente verktøy kan rotasjonen ikke skje trinnløst, men må tas med faste vinkelutslag i en størrelsesorden på 15-20 grader. Dette betyr at boreretningen ikke kan endres med den nøyaktighet som er ønskelig. En annen ulempe ved kjente verktøy er at pådraget i borekronen må reduseres for å gjøre det mulig med rotasjon av bøyeleddet. Dette kan få som konsekvens at borekronen mister taket i grunnformasjonen, slik at bøyeleddet, i steden for å fullføre rotasjonen, returnerer til utgangstillingen. Dette er forhold som vanskelig-

gjør, og dessuten forsinker arbeidet med å endre boreretningen.

Hovedformålet med foreliggende oppfinnelse er å skaffe til veie en anordning ved et verktøy hvor rotasjonen av bøyeleddet kan gjøres trinnløst. Andre formål er at rotasjonen skal foregå med fullt pådrag i borekronen, og at rotasjonen skal foregå med en hastighet som tillater at måleutstyret gir måleresultat som er i overenstemmelse med den faktisk rotasjon. Derved vil boreretningen kunne endres uten de ulemper som er nevnt ovenfor. Verktøyet vil dessuten få en noe enklere betjening og gi større presisjon under rotasjonen enn det som har vært vanlig. Dette er realisert ved foreliggende anordning ved et verktøy tilpasset for å endre boreretningen under boring. Boreutstyret som benyttes under boringen, omfatter fortrinnsvis borestreng så som kveilrør, bøyeledd, boremotor og borekrone. Videre er verktøyet anbrakt mellom borestrengen og bøyeleddet, omfatter husdeler som er innbyrdes forbundet, har gjennomløp for bl. a. væske så som borevæske, og kan aktiveres for rotasjon av bøyeleddet, slik at boreretningen endres. Det særegne ved oppfinnelsen er at verktøyet er anordnet middel slik tilpasset at rotasjonen kan skje trinnløst. Nevnte middel er anbrakt i verktøyets gjennomløp, og omfatter en ventil tilpasset for å strupe gjennomløpet, slik at verktøyet kan aktiveres for rotasjonen, et stempel tilpasset for å besørges rotasjonen etter at gjennomløpet er strupt ned, og sett av samvirkende føringer tilpasset for tvangsstyring av rotasjonen. Føringene er tildannet i gjennomløpets vegg, henholdsvis i stempelets motstående vegg. Andre detaljer ved oppfinnelsen fremgår av de uselvstendige patentkrav og den etterfølgende del av beskrivelsen.

Det vil i med henvisning til det vedføyde figursettet bli redegjort for en foretrukket, men ikke-begrensende utføringsform av oppfinnelse, hvor:

Fig. 1 viser et skjematisk oppriss av lengdesnitt gjennom verktøyet i tre typiske stillinger, dvs i ikke-aktivert stilling med åpent gjennomløp for væske, og i aktivert stilling med strupt gjennomløp før rotasjonen er påbegynt, henholdvis etter at rotasjonen er fullført;

Fig. 2 viser et skjematisk oppriss av et lengdesnitt gjennom verktøy i ikke-aktivert stilling med åpent gjennomløp for væske;

Fig. 3 viser samme skjematiske oppriss som i fig. 2, men med verktøyet i aktivert stilling med strupt gjennomløp for væske, slik at verktøyet er klargjort for rotasjonen;

Fig. 4 viser samme skjematiske oppriss som i Fig. 1, men med det aktiverte verktøy i en endestilling med fullt utslag under rotasjonen, og:

Fig. 5 viser et skjematisk oppriss av et snitt i tverretningen gjennom skrallemekanismen i når verktøyet i de stillinger som er nevnt over.

I fig. 2-4 er verktøyet for oversiktens skyld delt i to deler. og tallhenvisningene er fordelt mellom figurene, slik at tallhenvisninger i én figur refererer til samme detalj i de andre figurene.

Verktøyet 1 er satt sammen av husdeler 2, 3, 4, 5 som er innbyrdes forbundet, og tildannet med boringer, slik at verktøyet 1 får gjennomløp for bl. a. borevæske. Borestrengen er fast forbundet til øvre ende av øvre husdel 2, og bøyeleddet er fast forbundet til nedre ende av nedre husdel 5. Forbindelsene mellom husdelene 2, 5, borestrengen og bøyeleddet kan f. eks. være gjengeforbindelser. Øvre ende av øvre mellomliggende husdel 3 er fast forbundet til nedre ende av øvre husdel 2. Boringen i mellomliggende husdel 3 har slik pasning at nedre en-

de av øvre husdel 2 kan føres et stykke inn i mellomliggende husdel 3. Forbindelsen 6 mellom husdelene 2, 3 kan f. eks. være en gjengeforbindelse, og den er gjort trykktett ved hjelp av en tetning 9 som er anbrakt i pasningen mellom husdelene 2, 3. Nedre ende av øvre mellomliggende husdel 3 er fast forbundet til øvre ende av nedre mellomliggende husdel 4. Boringen i nedre ende av øvre mellomliggende husdel 3 har slik pasning at øvre ende av nedre husdel 5 kan føres et stykke inn i øvre mellomliggende husdel 3. Forbindelsen 7 mellom husdelene 3, 4 kan f. eks. være en gjengeforbindelse, og den er gjort trykktett ved at det er anbrakt en tetning 10 i pasningen mellom husdelene 3, 4. Nedre mellomliggende husdel 4 er roterbart forbundet til nedre husdel 5. Forbindelsen 8 er slik at rotasjon bare tillates i negativ retning, nemlig motsatt rotasjonsretningen for bøyeleddet, og kan f. eks. være et rullelager. Den er gjort trykktett ved hjelp av en tetning 11 som er anbrakt i pasningen mellom husdelene 4, 5. Boringen i nedre mellomliggende husdel 4 er dessuten slik tilpasset at nedre mellomliggende husdel 4 blir anbrakt utenpå og et stykke opp fra nedre ende av nedre husdel 5. Det er dessuten plassert et thrustlager mellom øvre ende av lageret 8 og en innover vendt skulder på den mellomliggende husdel 4.

Nedre ende av øvre husdel 2 og øvre ende av nedre mellomliggende husdel 4 er som nevnt ført inn i boringen i øvre mellomliggende husdel 3, og endeflatene på disse danner derfor en øvre skulder 14 i verktøyets 1 gjennomløpet, henholdsvis en nedre skulder 30 i et øvre ringrom 17. Videre er nedre husdel 5 tildannet med en lengde som gjør at nedre husdel 5 forløper et forholdsvis langt stykke opp i øvre mellomliggende husdel 3. Boringen i øvre mellomliggende husdel 3 har dessuten så stor pasning at øvre ringrom 17 tildannes mellom øvre mellomliggende husdel 3 og den del 16 av nedre husdel 5 som forløper forbi nedre skulder 30.

Verktøyet 1 er utstyrt med et hylseformet stempel 18 som er anbragt under den øvre skulder 14 i verktøyet. Stempelet 18

har en lengde som gjør at stempelet 18 kan strekke seg fra øvre skulder 14, forbi øvre ende av nedre husdel 5 og inn i øvre ringrom 17. Pasningen mellom stempelet 18 og øvre ende av nedre husdel 5 er gjort trykktett ved hjelp av en tetning 13. Stempelet 18 er, tilsvarende husdelene 2, 3, 4, 5, tildannet med en boring, slik at stempelet 18 ikke stenger gjennomløpet i verktøyet 1. I øvre ende er stempelet 18 tilordnet en ventil med et ventillegeme 21 som kan føres mot et ventilsete 20, slik at ventilen kan strupe ned gjennomløpet i verktøyet 1. Ventillegemet 21 er forbundet til stempelet 18 ved hjelp av en holdedel 19 som er anbrakt ved øvre ende av boringen i stempelet 18. Holdedelen 19 er slik tildannet at væske kan passere.

Ventilen strupes når ventillegemet 21 går til anlegg mot ventilsetet 20. I foreliggende tilfelle strupes ventilen ved trykkøkning i væsken som passerer gjennom verktøyet. Ventilmekanismen omfatter øvre og nedre ventillegemedeler 22, 23 som er tildannet for å kunne forskyves langs ventillegemet 21 for å strupe, henholdsvis åpne ventilen. Ved hjelp av fjærkraften i en ventillegemefjær 24 holdes nedre ventillegemedel 23 i en første endestilling hvor ventilen er åpen for væskepassasje. Dersom trykket i væsken som passerer økes, vil væsken besørge at nedre ventillegemedel 23 forskyves av øvre ventillegemedel 22 til en andre endestilling hvor ventilen er strupt, slik at det blir trykkfall i væsken som passerer gjennom ventilen. Fjærkraften i ventillegemefjæren 24 vil, ved avlastning av trykket i væsken, åpne ventilen ved at nedre ventillegemedel 23 og øvre ventillegemedel 22 forskyves til første endestilling. Det er selvsagt at ventilen kan ha annen konstruksjon enn den som er vist i figursettet, f. eks. tildannet med fast struping. Ventillegemedelen 21 og øvre ventillegemedel 22 kan ha boringer, slik at de blir mulig å trekke kabel som er anbrakt i gjennomløpet gjennom ventilen.

Væsken som tilføres i verktøyet 1 når ventilen er strupt ned, vil som følge av trykkfallet over ventilen, besørge at stempelet 18 drives fra en første endestilling hvor øvre ende av

stempelet 18 ligger an mot øvre skulder 14, til en andre endestilling hvor nedre ende av stempelet 18 har presset sammen en stempelfjær 25 som er anbrakt i øvre ringrom 17. Fjærkraften i den sammenpressede stempelfjær 25 vil besørge at stempelet 18 drives tilbake til anlegg mot øvre skulder 14 når ventilen igjen åpnes ved at væsketrykket reduseres. Stempelfjæren 25 ligger i nedre ende an mot en skulderdel 31 som er plassert i øvre ringrom 17 over nedre skulder 30. Mellom skulderen 30 og skulderdelen 31 er det anbragt et nedre thrustlager 32, tallerkenfjærer 33, en bæredel 34 som holdes i stilling av en låsemekanisme 35, og et øvre thrustlager 35. Låsemekanismen 35 er felt et stykke inn i sideveggen av den del 16 av nedre husdel 5 som er vendt inn mot øvre ringrom 17.

Væske vil fortrenges fra øvre ringrom 17 under rotasjonen. Denne væsken ledes under fortrengningen til et nedre ringrom 36 som er tildannet i gjennomløpet av verktøyet ved nedre ende av nedre husdel 5. Nedre ringrom 36 avtettes ved hjelp av et forskyvbart ringromslegeme 37 som er gjort trykktett ved hjelp av tetninger 42, 43. Ringromlegemet 37 forskyves nedover i nedre ringrom 36 av væske som fortrenges fra øvre ringrom 17, og forskyves oppover i nedre ringrom 36 av væsken i gjennomløpet etter at ventilen er åpnet. Alternativ kan forskyvningen oppover skje ved hjelp av en ikke vist fjær som er plassert i nedre ringrom 36 under ringromlegemet 37. Kanaler 38, 39 besørger passasje fra øvre ringrom 17 til nedre ringrom 36. Den ene av kanalene 38 er avtettet mot det øvre ringrom 17 ved hjelp av en tilbakeslagsventil 40, og den andre av kanalene 39 er avtettet mot øvre ringrom 17 ved hjelp av en strupeventil 41. Nevnte ventiler 40, 41 er plassert i nedre skulder 30. I tillegg er trustlagrene 32, 36, tallerkenfjærene 33 og bæredelen 34 slik innrettet av den væske som fortrenges under rotasjonen kan passere.

For å besørge tvangsstyrt rotasjon av nedre husdel 5 som er forbundet til bøyeleddet, samtidig som stempelet 18 forskyves i verktøyets 1 gjennomløp, er et omkretsparti av boringen i

øvre mellomliggende husdel 3, fortrinnsvis i området ved øvre ende av nedre husdel 5, og et omkretsparti av stempelet 18, fortrinnsvis langs det vesentlige av stempelets 18 lengderetningen, tildannet med føringer 26, 27 så som vridde sline. Videre er stemplet 18 roterbart og forskyvbart forbundet med øvre ende av nedre husdel 5. Denne roterbare og forskybare forbindelse kan utgjøres av en skrallemekanisme 28 slik innrettet at den kan forskyves langs et antall føringer 29. Føringene 29 er anbrakt i øvre ende og på den side av nedre husdel 5 som er vendt inn i øvre ringrom 17. Føringene 29 forløper dessuten fortrinnsvis langs store deler av veggen i og fortrinnsvis parallelt med øvre ringroms 17 lengderetning. Sperredelene 30 i skrallemekanismen vil ligge låsende an mot føringene 29, slik at rotasjon av nedre husdel 5 i negativ retning forhindres under rotasjonen av bøyeleddet, men tillate rotasjon i motsatt retning når stempelet 18 returnerer etter avsluttet rotasjon.

Foreliggende oppfinnelse vil besørge at rotasjonen av bøyeleddet kan skje trinnløst. Ved å senke væsketrykket, slik at ventilen i stempelet 18 åpner væskepassasjen, kan rotasjonen dessuten avbrytes når ønsket utslag er nådd. Ved større utslag skjer rotasjonen ved at ventilen i verktøyet 1 strupes, åpnes, strupes, o.s.v. inntil bøyeleddet er i ønsket posisjon. Skrallemekanismen 28, som forbinder stempelet 18 og nedre husdel 5, vil bidra til at borekronen kan drives med fullt pådrag. Når stempelfjæren 25 fører stempelet 18 tilbake til utgangsstillingen i anslag mot øvre skulder 14 etter åpningen av ventilen, vil skrallemekanismen 28 og den roterbare forbindelse 8 besørge at stempelet 18 kan rotere i motsatt retning. Samtidig som nedre husdel 5 blir stående uten rotasjon. Det skal nevnes at skrallemekanismen 28 og den roterbare forbindelse 8 kan erstattes av forbindelser som låses mekanisk.

Fortregningsmekanismen virker på den måte at strupeventilen 41 åpnes når verktøyet er aktivert for rotasjon, slik at væsken kan fortrenges fra øvre ringrom 17 til nedre ringrom 36 gjen-

nom kanalen 39. Samtidig blir ringromstempellegemet 37 forskjøvet nedover i nedre ringrom 36 av fortrengt væske. Etter avsluttet rotasjon vil væsken returnere til øvre ringrom 17 gjennom kanalen 38 etterhvert som ringromslegemet 37 forskyves oppover i nedre ringrom 36 av væsken som strømmer gjennom verktøyet. Ved å regulere strupningen på strupeventilen 41 kan verktøyets rotasjonshastighet styres, slik at ovennevnte måleutstyr blir i stand til i gi måleresultat som er i overenstemmelse med den faktiske rotasjon som verktøyet 1 har besørget.

Beskrivelsen vil bli avsluttet med en kortfattet gjennomgang av foreliggende verktøys virkemåte. Fig. 2 vises som nevnt verktøyet 1 i en ikke-aktivert stilling under boringen. Ventilen er da åpen, slik at væsken som sirkulerer i borestrengen kan passere uhindret gjennom verktøyet 1. Verktøyet 1 aktiveres for rotasjon ved å øke trykket i væsken som passerer gjennom verktøyet 1. Det økte væsketrykket forskyver øvre ventillegemedel 22 nedover langs ventillegemet 21, slik at nedre ventillegemedel 23 føres til en stilling i anslag mot ventilsetet 20. Derved er ventilen strupt. Væsken som tilføres og passerer gjennom verktøyet 1 etter at ventilen er strupt, vil som følge av trykkfallet over den strupte ventil, forskyve stempelet 18 nedover i verktøyets 1 gjennomløp. Derved vil føringene 26, 27 påtvinge stempelet 18 en rotasjon som styres av føringenes 26, 27 kurvatur. Under forskyvningen av stempelet 18 nedover i verktøyet 1 står sperredelene 30 i skrallemekanismen 28 an mot, samtidig som de føres nedover langs føringene 29 på øvre del av nedre husdel 5, slik at den nedre husdel 5 med påmontert bøyeledd roterer for å besørge endring av boreretningen. Rotasjonshastigheten kan som tidligere nevnt styres ved hjelp av strupningen i strupeventilen 41 i kanalen 39 mellom ringrommene 17, 36.

Rotasjonen avsluttes ved avlastning av trykket i væsken. Fjærkraften i ventillegemefjæren 24 vil følgelig overstige væsketrykket og forskyve den nedre ventillegemedel 23 oppover langs ventillegemet 21, slik at ventilen åpnes. Når ventilen er åpen

vil fjærkraften i den sammenpressede stempelfjær 25 i ringrommet 17, forskyve stempelet 18 oppover i verktøyets 1 gjennomløp. Sperredelene 30 i skrallemekanismen 28 vil under returbevegelsen av stempelet 18, tillate at stempelet 18 kan rotere mens den nedre husdel 5 blir stående i en stilling hvor husdelen 5 ikke roterer. Likeledes vil den roterbare forbindelse 8 mellom husdelene 4, 5 bidra til det samme dersom skrallemekanismen ikke fullt ut klarer å ta hånd om returrotasjonen av stempelet 18. Ved større retningsendringer gjentas ovennevnte syklus inntil ønsket utslag er nådd for bøyeleddet.

Patentkrav

1. Anordning ved verktøy (1) tilpasset for å endre boreretning under boring med boreutstyr som fortrinnsvis omfatter borestreng så som kveilrør, borestrengsledd, boremotor og borekrone, hvor verktøyet (1) er anbrakt mellom borestrengen og bøyeleddet, omfatter husdeler (2-4) som er innbyrdes forbundet, har gjennomløp for bl. a. væske så som borevæske, og hvor verktøyet (1) kan aktiveres for rotasjon av borestrengsleddet, slik at boreretningen endres, hvor verktøyet (1) er tilordnet midler (18, 20-24, 26, 27) som er tilpasset slik at rotasjonen kan skje trinnløst, og hvor nevnte midler (18, 20-24, 26, 27) er anbrakt i verktøyets (1) gjennomløp, og omfatter en ventil (20-24) som er innrettet til å strupe gjennomløpet, slik at verktøyet (1) kan aktiveres for rotasjon, idet det er anordnet et stempel (18) som er innrettet til å iverksette rotasjonen etter struping av gjennomløpet, mens sett av samvirkende føringer (26, 27) er anordnet for tvangsstyring av rotasjonen, k a r a k t e r i s e r t v e d at ett sett føringer (26) er tildannet i gjennomløpets vegg, og ett sett føringer (27) er tildannet i stempelets (18) motstående vegg.

2. Anordning ifølge krav 1, k a r a k t e r i s e r t v e d at nevnte sett av føringer (26, 27) for tvangsstyring av rotasjonen, utgjøres av vridde spliner, idet ett sett spliner (26) er utformet i et omkretsparti i den øvre mellomliggende husdel (3), mens ett sett spliner (27) er utformet i et omkretsparti av stemplet (18).

3. Anordning ifølge krav 2, k a r a k t e r i s e r t v e d at førstnevnte splinesett (26) strekker seg i et område ved den øvre ende av den nedre husdel (5), mens det sistnevnte splinesett (27) strekker seg i det vesentlige i stemplets (18) lengderetning.

4. Anordning ifølge krav 1, k a r a k t e r i s e r t v e d at ventilen omfatter et ventilsete (20) tildannet i øvre ende av en boring tilpasset for å gi gjennomløp i stempelet (18), et ventillegeme (21), og en ventilmekanisme (22, 23, 24) tilpasset for å strupe, henholdsvis åpne ventilen ved økning, henholdsvis avlasting av væsketrykket i verktøyet (1).

5. Anordning ifølge krav 4, k a r a k t e r i s e r t v e d at ventilmekanismen utgjøres av en øvre og en nedre ventillegemedel (22, 23) tilpasset for å forskyves langs ventillegemet (21), slik at den nedre vedtillegemedel (23) kan strupe, henholdsvis åpne ventilen, og en ventillegemefjær (24), idet den øvre ventillegemedel (22) vil forskyve den nedre ventillegemedel (23) for å strupe ventilen ved økning av trykket i væsken, og ventillegemefjæren (24) vil forskyve den nedre ventillegemedel (23) i motsatt retning for å åpne ventilen ved avlastning av trykket i væsken.

6. Anordning ifølge et hvilket som helst av de foranstående krav, k a r a k t e r i s e r t v e d at stempelet (18) er tilpasset for å forskyves av væsken som tilføres i verktøyet (1) når ventilen strupt ned, henholdsvis forskyves i motsatt retning av en stempelfjær (25) som er anbrakt i et øvre ringrom (17) tildannet i verktøyets (1) gjennomløp etter at ventilen er åpnet.

7. Anordning ifølge krav 6, k a r a k t e r i s e r t v e d at stempelet (18) er hylseformet, anbrakt mellom en øvre skulder (14) tildannet i vektøyets (1) gjennomløp og en skulderdel (31) som er anbragt i det øvre ringrom (17), og tildannet med en lengde som gjør at stempelet (18) kan forløpe fra den øvre skulder (14) og inn i det øvre ringrom (17) som er anbrakt i forlengelsen over en nedre skulder (15) tildannet i nedre ende av det øvre ringrom (17).

8. Anordning ifølge et hvilket som helst av de foranstående krav, k a r a k t e r i s e r t v e d at stempelet (18) og øvre ende av den nedre husdel (5) er forskyvbart og roterbart forbundet.

9. Anordning ifølge krav 8, k a r a k t e r i s e r t v e d at den forskyvbare og roterbare forbindelse utgjøres av en skrallemekanisme (28) tildannet med sperredeler (30) som låser an mot, henholdsvis løper fritt over føringer (29) tildannet i øvre ende av den nedre husdel (5), slik at den nedre husdel (5) påføres rotasjon når stempelet (18) forskyves nedover i verktøyet (1) gjennomløp, henholdsvis er uten rotasjon når stempelet (18) forskyves tilbake i verktøyets (1) gjennomløp.

10. Anordning ifølge et hvilket som helst av de foranstående krav, k a r a k t e r i s e r t v e d at den nedre mellomliggende husdel (4) og den nedre husdel (5) er forbundet med en roterbar forbindelse (8) så som et rullelager, tilpasset for bare å tillate rotasjon motsatt av rotasjonsretningen som besørger endring av boreretningen.

11. Anordning ifølge et hvilket som helst av de foranstående krav, k a r a k t e r i s e r t v e d at den nedre husdel (5) er tilordnet et nedre ringrom (36) for væske som fortrenges fra det øvre ringrom (17), at ringrommene (17, 36) står i forbindelse ved hjelp av kanaler (38, 39) som forløper mellom ringrommene (17, 36), og at strømmen av fortrengt væske kan styres av henholdsvis en enveisventil (40) og en strupeventil (41) som er plassert i respektive kanal (38, 39).

12. Anordning ifølge krav 11, k a r a k t e r i s e r t v e d at det nedre ringrom (36) er tilordnet et forskybbart ringromlegeme (37).

13. Anordning ifølge et hvilket som helst av de foranstående krav, k a r a k t e r i s e r t v e d at ventillegemet (21) og ventillegemedelen (22) er tildannet med boringer, slik at f. f. eks. kabel kan trekkes i verktøyets (1) gjennomløp.

S a m m e n d r a g

Oppfinnelsen angår en anordning ved verktøy (1) tilpasset for å endre boreretningen under boring. Boreutstyret som benyttes under boringen, omfatter fortrinnsvis borestreng så som kveilrør, bøyeledd, boremotor og borekrone. Verktøyet (1) er anbrakt mellom borestrengen og bøyeleddet, omfatter husdeler (2-5) som er innbyrdes forbundet, og har gjennomløp for bl. a. væske så som borevæske. Verktøyet kan aktiveres for rotasjon av bøyeleddet, slik at boreretningen endres. Formålet med oppfinnelsen er å fremskaffe et verktøy hvor rotasjonen av bøyeleddet kan foregå trinnløst. Dette er realisert ved hjelp av middel (18, 20-24, 26, 27) som er anbrakt i verktøyets (1) gjennomløp, og omfatter en ventil (20-24) tilpasset for å strupe gjennomløpet, slik at verktøyet (1) kan aktiveres for rotasjon, et stempel (18) tilpasset for å besørges rotasjonen etter at gjennomløpet er strupt ned, og sett av samvirkende føringer (26, 27) tilpasset for tvangsstyring av rotasjonen. Føringene (26,27) kan utgjøres av vridde sline som er tildannet i gjennomløpets vegg, henholdsvis i stempelets (18) motstående vegg.

(Fig. 2)

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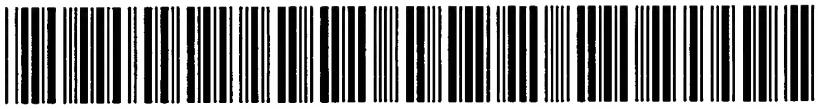

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6	REM	3
7	SPEC	8
8	ABST	1
9	DRW	6
10	XT/	1

Total number of pages: 39

Remarks:

Order of re-scan issued on .....